

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A fibre optic grating sensor comprising an optical fibre having a grating portion along which the refractive index of the fibre varies periodically during transmission, the periodic variation having an amplitude envelope which includes at least one region in which the amplitude of the envelope is substantially reduced, the ~~said~~ variation giving the grating portion a spectral profile within which there is at least one pass band.
2. (Original) A sensor according to claim 1 in which the amplitude envelope includes a plurality of regions in which the amplitude of the envelope is substantially reduced.
3. (Original) A sensor according to claim 2 in which the amplitude envelope includes a plurality of regions in which the amplitude of the envelope is substantially nulled.
4. (Currently amended) A sensor according to claim 2 in which the periodic variation in ~~the or each~~ at least one of the regions includes a section in which the phase of the periodic variation substantially reverses.
5. (Original) A sensor according to claim 2 in which adjacent regions are spatially separated.
6. (Currently amended) A sensor according to claim 2 in which ~~the or each~~ at least one region gives rise to a corresponding pass band.
7. (Original) A sensor according to claim 6 in which each region is an independently actuatable sensor element operable to vary the wavelength of the corresponding pass band in response to a change in a parameter being measured.
8. (Original) A sensor according to claim 1 in which the grating portion comprises two substantially superimposed fibre Bragg gratings.

9. (Original) A sensor according to claim 8 in which the amplitudes of the refractive index profiles of the two gratings add together to form the amplitude envelope.
10. (Original) A sensor according to claim 8 in which the fibre Bragg gratings are chirped fibre Bragg gratings.
11. (Currently amended) A sensor according to claim 10 in which the two chirped gratings have substantially the same rate of chirp and substantially the same spectral bandwidth, the first chirped grating having a different central wavelength ~~to~~ than the second chirped grating.
12. (Currently amended) A sensor according to claim 10 in which the first chirped grating has a different rate of chirp ~~to~~ than the second chirped grating, and the two chirped gratings have substantially the same central wavelength and bandwidth.
13. (Original) A sensor according to claim 8 in which the fibre Bragg gratings are linear fibre Bragg gratings.
14. (Original) A sensor according to claim 13 in which the two linear gratings have substantially the same spectral bandwidth.
15. (Currently amended) A sensor according to claim 14 in which the first linear grating has a different central wavelength ~~to~~ than the second linear grating.
16. (Original) A sensor according to claim 1 in which the grating portion comprises one fibre Bragg grating having a plurality of regions within which the refractive index profile of the grating is substantially reduced or nulled.
17. (Original) A sensor according to claim 16 in which the fibre Bragg grating is a linear grating or a chirped grating.

18. (Currently amended) A sensor according to claim 8 in which ~~the or each~~ at least one fibre Bragg grating is fabricated using a two-beam interference holographic fabrication method.

19. (Currently amended) A sensor according to claim 8 in which ~~the or each~~ at least one fibre Bragg grating is fabricated using a phase-mask fabrication method.

20. (Currently amended) A sensor according to claim 18 in which ~~the or each~~ at least one region in the fibre Bragg grating is formed in a fibre Bragg grating fabricated using the two-beam interference holographic fabrication method by providing an amplitude mask generally in front of the fibre, generally in the beam paths, during fabrication.

21. (Currently amended) A sensor according to claim 19 in which ~~the or each~~ at least one region in the fibre Bragg grating is formed in a fibre Bragg grating fabricated using one of the two-beam interference holographic fabrication method and the phase-mask fabrication method by ~~subsequently~~ further exposing regions of the grating.

22. (Original) A sensor according to claim 1 in which the grating portion comprises a single grating structure fabricated using a phase-mask fabrication method.

23. (Currently amended) A sensor according to claim 22 in which the desired grating structure is represented on a phase-mask and ~~subsequently~~ inscribed into the fibre through the phase-mask.

24. (Original) A sensor according to claim 22 in which the grating structure is inscribed in the fibre through a phase-mask while the fibre undergoes oscillating motion along its longitudinal direction, relative to the phase-mask, to thereby control the refractive index profile within the grating structure.

25. (Currently Amended) A fibre optic grating sensor comprising an optical fibre having a grating portion along which ~~the~~ a refractive index of the fibre varies periodically during transmission, the periodic variation including at least one section in which the phase of the

periodic variation substantially reverses, the ~~said~~ variation giving the grating portion a spectral profile within which there is at least one pass band.

26. (Original) A sensor according to claim 25 in which the grating portion includes a plurality of sections in which the phase of the periodic variation substantially reverses.

27. (Original) A sensor according to claim 26 in which adjacent phase reversal sections are spatially separated.

28. (Currently amended) A sensor according to claim 26 in which ~~the or each~~ at least one phase reversal section gives rise to a corresponding pass band.

29. (Original) A sensor according to claim 28 in which each section is an independently actuatable sensor element operable to vary the wavelength of the corresponding pass band in response to a change in a parameter being measured.

30. (Original) A sensor according to claim 25 in which the period of the periodic variation changes along substantially the full length of the grating portion.

31. (Original) A sensor according to claim 25 in which the grating portion comprises two substantially overlapping chirped fibre Bragg gratings, the first chirped grating being spatially shifted relative to the second chirped grating by an integer plus a fraction of the period of the first grating.

32. (Original) A sensor according to claim 31 in which the first chirped grating is spatially shifted relative to the second chirped grating by an integer plus one half of the period of the first grating.

33. (Currently amended) A sensor according to claim 31 in which the two chirped gratings have substantially ~~the~~ a same rate of chirp and substantially ~~the~~ a same spectral bandwidth, the first chirped grating having a different central wavelength ~~to~~ than the second chirped grating.

34. (Currently amended) A sensor according to claim 31 in which the first chirped grating has a different rate of chirp ~~to~~ than the second chirped grating, and the two chirped gratings have substantially the same central wavelength and bandwidth.
35. (Original) A sensor according to any of claim 31 in which the fibre Bragg gratings are fabricated using a known two-beam interference holographic fabrication method.
36. (Original) A sensor according to claim 31 in which the fibre Bragg gratings may be fabricated using a known phase-mask fabrication method.
37. (Currently amended) A sensor ~~ac-cording~~ according to claim 25 in which the grating portion comprises one chirped fibre Bragg grating having a plurality of sections in which the phase of the periodic variation substantially reverses.
38. (Original) A sensor according to claim 37 in which the single chirped fibre Bragg grating is fabricated using a known phase-mask fabrication technique.
39. (Currently amended) A sensor according to claim 38 in which a first part of the chirped grating ~~having a first spectral bandwidth~~ is represented on a phase-mask and ~~subsequently~~ inscribed into the fibre, the first part of the chirped grating having a first spectral bandwidth.
40. (Original) A sensor according to claim 39 in which a second part of the chirped grating having a second spectral bandwidth is inscribed into the fibre substantially spatially and spectrally adjacent the first part, the first and second parts together forming the chirped grating.
41. (Original) A sensor according to claim 40 in which the chirped grating comprises a plurality of such parts arranged substantially spatially and spectrally sequentially adjacent one another.

42. (Original) A sensor according to claim 39 in which the fibre is under a first strain during inscription of the first part.
43. (Original) A sensor according to claim 40 in which the fibre is under a first strain during inscription of the first part and is under a second strain during inscription of the second part, the first and second strains being different.
44. (Currently amended) A sensor according to claim 37 in which the chirped grating is fabricated using a single phase-mask, the desired structure of the chirped grating being represented on the phase-mask and subsequently inscribed into the fibre through the phase-mask.
45. (Original) A sensor according to claim 37 in which the chirped grating is fabricated using a known continuous writing technique.
46. (Original) A sensor according to claim 25 in which the optical fibre is photosensitive enhanced optical fibre.
47. (Original) A sensor according to claim 46 in which the photosensitive enhanced optical fibre is germania doped optical fibre, or boron-germania co-doped optical fibre.
48. (Original) A sensor according to claim 46 in which the fibre is hydrogen loaded to increase the photosensitivity of the fibre.
49. (Original) A sensor according to claim 48 in which the hydrogen loaded fibre is annealed following fabrication of the grating structure to substantially remove any residual hydrogen from the fibre.
50. (Original) A sensor according to claim 1 in which the grating portion comprises a surface-relief grating structure side-etched in an optical fibre.

51. (Original) A sensor according to claim 25 in which the fibre grating sensor comprises a plurality of grating portions.

54. (Original) A sensor according to claim 25 in which the grating portion comprises a surface-relief grating structure side-etched in an optical fibre.